

REMARKS

Applicants thank the Examiner for total consideration given the present application. Claims 17-36 were pending prior to the final Office Action. Claims 21 and 34 have been canceled and claim 37 has been added through this Reply. Therefore, claims 17-20, 22-33, and 35-37 are currently pending. Claims 17, 28-30, and 35-37 are independent. Claims 17, 19, 20, 22, 28-30, 33, 35, and 36 have been amended through this Reply. Applicants respectfully request reconsideration in light of the amendment and remarks presented herein, and earnestly seek timely allowance of all pending claims.

35 U.S.C. § 102 REJECTION – Osada, Sano

A. Claims 17-24 and 28-36 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Osada (US 5,629,989)[hereinafter “Osada”]. Applicants canceled claims 21 and 34 and thereby rendering the rejection moot. Further, Applicants respectfully submit that Osada does not anticipate amended independent claims 17, 28-30, 35, and 36.

For a Section 102 rejection to be proper, the cited reference must teach or suggest each and every claimed element. *See M.P.E.P. 2131; M.P.E.P. 706.02.* Thus, if the cited reference fails to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

Osada fails to teach or suggest each and every claimed element of independent claims 17, 28, and 29. For example, amended independent claim 17 recites, *inter alia*, “**performing a Hough transform on points in an image space to a 2-dimensional Hough space, to derive a histogram of accumulated values in Hough space**, selecting points in the Hough space representing features in the image space, *wherein said selected points are peaks of the histogram of accumulated values in Hough space*, . . . **projecting and accumulating said selected points onto one axis of the two axes of the Hough space**, and analysing the

variable corresponding to said one axis and the corresponding accumulated selected points values to derive information about the features in the image space.” Emphasis added.

Independent claims 28 and 29 recites means and a computer readable medium respectively for performing the above-identified claim features of claim 17.

It is respectfully submitted that Osada does not teach or suggest at least the above-identified claim features of independent claims 17, 28, and 29.

Osada merely discloses an image line-segment extracting apparatus including an image pick-up portion 1, an edge detecting portion 2 for detecting an edge of the image transmitted from the image pick-up portion 1 by differentiating a digitized image consisting of pixels, a Hough transform portion 3 for transforming a sequence of dots composing the detected edge in an image into Hough function curves, a histogram plotting portion 4 for making a histogram of Hough function values, and a line-segment extracting portion 5 consisting of a microcomputer which detects a frequency peak of the histogram and selects and extracts a line-segment from the image, judging that a sequence of dots composing the image edge corresponding to the Hough function curves passing the detected peak is the line segment, and which also conducts the concentrated control of the whole system of the apparatus. Osada is particularly concerned in determining a region and an amount of influence of a remarkable peak upon frequency distribution of a histogram plotted by the histogram plotting portion 4. Further, Osada discloses a means to judge whether detected peaks other than the remarkable peak lie in the region or not and means to correct frequency values of the other peaks judged to be in the defined region according to the determined amount of influence. (See col. 3, lines 17-46.)

Briefly, Osada carries out a standard Hough transform, involving calculating an accumulated histogram in Hough space. According to the claimed invention, there is the standard Hough transform, with an accumulated histogram in Hough space, followed by a further accumulation. More specifically, as demonstrated above, claims 17, 28, and 29 require that peaks of the histogram of accumulated values in Hough space are identified, and then those selected points are projected onto an axis and accumulated. Although Osada describes a

technique involving the Hough transform, including deriving a histogram in Hough space and detecting peaks, there is no disclosure or suggestion in Osada of this **projection and accumulation of selected points in Hough space**. As a result of the claimed invention, **additional information about feature points in the image**, such as predominant directions of lines, can be derived. This is not disclosed or suggested in Osada.

Therefore, for at least the above reasons, it is respectfully submitted that Osada cannot anticipate, at least, “selecting points in the Hough space representing features in the image space, *wherein said selected points are peaks of the histogram of accumulated values in Hough space, . . . projecting and accumulating said selected points onto one axis of the two axes of the Hough space*, and analysing the *variable corresponding to said one axis* and the corresponding accumulated *selected points* values to derive *information about the features* in the image space” as recited in independent claims 17, 28, and 29.

Although the Examiner states that claims 17-24 and 28-36 are rejected under 35 U.S.C. § 102(b) as being anticipated by Osada, (*see page 3, section 4 of the final Office Action*) Applicants note that the Examiner fails to provide any explanation in the final Office Action as to how Osada is being interpreted in rejecting independent claims 30-36. Thus, Applicants assume that the Examiner did not intend to reject claims 30-36 under 35 U.S.C. §102(b) as being anticipated by Osada. Even if Applicants’ assumption is wrong, it is respectfully submitted that Osada fails to teach or suggest each and every claim element of amended independent claims 30, 35, and 36. Particularly, Applicants submit that Osada fails to teach any step of combining the histograms for the reference images for the same type of feature to generate a combined histogram, and using the combined histogram to derive said threshold as recited in claims 30, 35, and 36.

Therefore, for at least these reasons, independent claims 17, 28-30, 35, and 36 are distinguishable from Osada. Dependent claims 18-20, 22-27, and 31-33 are at least allowable by virtue of their dependency on corresponding allowable independent claims.

B. Claims 30-36 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Sano et al. (US 5,638,465)[hereinafter “Sano”]. Applicants canceled claim 34 and thereby rendering the rejection moot. Further, Applicants respectfully submit that Sano does not anticipate amended independent claims 30, 35, and 36.

For example, amended independent claim 30 recites, “a method of *generating a threshold for identifying peaks in a histogram of accumulated values derived from a Hough transform of a subject image, each peak representing the same type of feature in the subject image*, the method comprising generating a plurality of reference images, *for each reference image performing the same Hough transform for identifying said type of feature and deriving a histogram of accumulated values in Hough space, combining the histograms for the reference images for the same type of feature to generate a combined histogram, and using the combined histogram to derive said threshold.*” *Emphasis added.* Independent claims 35 and 36 recite means and a computer readable medium respectively for performing the above-identified claim features of claim 30. It is respectfully submitted that Sano does not teach or suggest the above identified claim features of independent claims 30, 35, and 36.

Independent claims 30, 35, and 36 have been amended to clarify that it relates to a method of generating a threshold for identifying peaks in a histogram of accumulated values (in Hough space), each peak representing the same type of feature (such as lines). As demonstrated above, the claimed invention of claims 30, 35, and 36 comprises generating a plurality of reference images, and for each reference image performing the same Hough transform to identify the same type of feature, and combining the histograms for the reference images for the same type of feature to generate a combined histogram. The combined histogram represents the type of feature (such as lines) which can occur randomly in images, and a threshold derived from a combination of such random features can be used to exclude such random features when analyzing a subject image.

Sano relates to a weighted generalized Hough transform using a plurality of different features, such as intensity, curvature, complexity (Fig. 8) to determine if an object in an image is “good” or “no good”. The combining steps mentioned in col. 17, lines 30-58 concern the combining of different features (see for example col. 17, line 32 “feature combining step”) to derive the weighted generalized Hough transform for all the features of interest. Also, the k-th feature image mentioned on lines 45-47 is the standard feature image used for calculating similarity (see col. 12, lines 10-11). The N feature images are thus distinct from the M training images (col. 15, line 54 to col. 17, line 32).

Sano is distinguished from the claimed invention in that in Sano, there is no combining of histograms of a plurality of training images for the same type of feature to form a combined histogram, and no deriving of a threshold from such a combined histogram.

As demonstrated above, the threshold in the above passages of Sano relates to determining if an object in an image is good or no good, based on a generalized Hough transform involving a plurality of features.

In contrast, the invention of present claims 30, 35, and 36 involves combining histograms derived from different images representing the same feature, to derive a threshold for selecting points which may represent said feature, by excluding randomly generated feature points. This is quite different from the combining of histograms for different features to derive a generalized Hough transform as in Sano (See col. 17). Further, in col. 14, Sano refers to analyzing histograms in Hough space for different images and thresholding to remove noise. However, neither the cited portions nor any other portions of Sano teach or suggest “deriving a histogram of accumulated values in Hough space, combining the histograms for the reference images for the same type of feature to generate a combined histogram, and using the combined histogram to derive said threshold” as recited in claims 30, 35, and 36.

Therefore, for at least these reasons, independent claims 30, 35, and 36 are distinguishable from Sano. Dependent claims 31-33 are at least allowable by virtue of their dependency on allowable independent claim 30 and further in view of novel features recited

therein. For example, regarding claim 33, there is no averaging of histograms in Sano. According to the present invention, this gives an approximate idea of feature points that may appear generally in random images, and is irrelevant in the context of the generalized Hough transform of Sano.

Accordingly, it is respectfully requested to withdraw the anticipation rejection of claims 30-33 and 35-36 based on Sano.

35 U.S.C. § 103 REJECTION – Osada, Sano, Laumeyer

A. Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Osada in view of Sano. Applicants respectfully submit that the combination of Osada and Sano does not render claims 25 and 26 obvious.

For a Section 103 rejection to be proper, a *prima facie* case of obviousness must be established. *See M.P.E.P. 2142*. One requirement to establish *prima facie* case of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. *See M.P.E.P. 2142; M.P.E.P. 706.02(j)*. Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

Claims 25 and 26 depend from claim 17. It is respectfully submitted that the combination of Osada and Sano fails to teach or suggest each and every limitation of claim 17. As demonstrated above, Osada fails to teach or suggest “selecting points in the Hough space representing features in the image space, *wherein said selected points are peaks of the histogram of accumulated values in Hough space, . . . projecting and accumulating said selected points onto one axis of the two axes of the Hough space*, and analysing the *variable corresponding to said one axis* and the corresponding accumulated *selected points* values to derive *information about the features* in the image space” as recited in claim 17. Sano has not been, and indeed cannot be, relied upon to correct at least this deficiency of Osada. Therefore, it is respectfully requested to withdraw the obviousness rejection of claims 25 and 26 based on Osada and Sano.

B. Claim 27 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Osada in view of Laumeyer et al. (US 6,363,161 B2)[hereinafter "Laumeyer"]. Applicants respectfully submit that the combination of Osada and Laumeyer does not render claim 27 obvious.

Claim 27 depends from claim 17. It is respectfully submitted that the combination of Osada and Laumeyer fails to teach or suggest each and every limitation of claim 17. As demonstrated above, Osada fails to teach or suggest "selecting points in the Hough space representing features in the image space, *wherein said selected points are peaks of the histogram of accumulated values in Hough space, . . . projecting and accumulating said selected points onto one axis of the two axes of the Hough space*, and analysing the *variable corresponding to said one axis* and the corresponding accumulated *selected points* values to derive *information about the features* in the image space" as recited in claim 17. Laumeyer has not been, and indeed cannot be, relied upon to correct at least this deficiency of Osada. Laumeyer merely discloses a system for automatically generating a database of images and positions of objects of interest identified from video images depicting roadside scenes that are recorded from a vehicle navigating a road and having a system that stores location metrics for the video images. (See Abstract.)

Therefore, for at least these reasons, claim 27 is distinguishable from the combination of Osada and Laumeyer.

NEW CLAIM 37

Claim 37 has been added, corresponding to amended claim 17, but generalized to n-dimensional Hough space. Therefore, for at least the reasons stated with respect to claim 17, claim 37 is also allowable over the cited prior art references.

CONCLUSION


In view of the above amendment and remarks, applicants believe that the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Ali M. Imam Reg. No. 58,755 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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